SECTION 02536

PRECAST MANHOLES & COVERS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

This section includes minimum construct requirements for precast concrete structures, in general. It also includes precast concrete manhole sections with bell and spigot joints with masonry transition to covering, anchorage, coating/lining and accessories.

1.02 RELATED SECTIONS:

A. Section 03300 - Cast-In-Place Concrete, Formwork & Reinforcing
B. Section 03600 - Grout
C. Section 04060 – Mortar
D. Section 05550 - Castings

1.03 REFERENCES:

Unless otherwise indicated, all materials, workmanship and practices shall be in accordance with the current editions of the following standards:

A. Florida Building Code

B. ACI 318, Building Code Requirements for Reinforced Concrete

C. PCI MNL 116, Manual for Quality Control for Plants and Production of Precast Concrete Products.

D. ASTM C62 - Specification for Building Brick (Solid masonry units made from Clay or shale).

E. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

F. ASTM A123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

1.04 SUBMITTALS:

Submit the following information for approval. Fabrication shall not begin until submission has been approved.

A. Satisfactory evidence that plant and production methods meet the requirements of PCI MNL 116.

B. Complete shop drawings of both concrete structure and castings and showing all dimensions, reinforcement data, concrete strengths, etc. If of a non-standard design or if required by the Engineer of Record submit design calculations and data. All computation shall bear the seal of a Professional Engineer registered in the State of Florida.

1.05 QUALIFICATIONS:

Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

PART 2 - PRODUCTS

2.01 MATERIALS:

Precast manholes shall conform to the requirements of ASTM C478, latest edition, the Miami-Dade Water and Sewer Department Standard Details and the following:

A. Reinforcement of Grade 60 bars.

B. Cement shall be Type II.

1. In sanitary sewage applications, where called for in the plans and/or specifications an antimicrobial admixture as specified below shall be utilized:

a. An antimicrobial agent, Con^{MIC}Shield®, or approved equal, shall be used to render the concrete uninhabitable for bacteria growth.
b. Contractor shall mix the liquid antimicrobial additive with the total water content of the concrete mix design in a proportion of 1 gallon per cubic yard. In the case of repairs to damaged concrete a proportion of 2 gallons per cubic yard shall be utilized.
c. In some instances all of the concrete in the structure in will receive the additive and in other instances only a portion of the concrete will receive the additive. Hence, the Contractor shall apply the additive only as directed in the specific instance.
d. Contractor shall submit a letter of certification to the Department, stating that the correct amount and correct mixing procedure was followed for all antimicrobial concrete.
e. Con^{MIC}Shield® antimicrobial additive shall be as manufactured by Con^{MIC}Shield® Technologies, Inc.; 541 Tenth Street NW #233, Atlanta, GA 30318; Phone: (877)543-2094.

C. Minimum shell thickness of manholes shall be eight (8) inches.

D. Lifting holes through the structure will not be permitted.

E. Three to five courses of brick shall be constructed atop the manhole corbel for height adjustment.

F. Joints shall be steel form bell and spigot type. Ram-Nek preformed plastic joint filler, or approved equal, shall be used in filling the of the joint with grout on both inside and outside of the joint.

G. Holes for pipe connections, with a diameter equal to the outside dimension of the connecting pipe plus an additional 4-inches, shall be formed in the manhole walls. No cutting or chipping of the pre-formed holes, or cutting additional holes in the precast concrete walls will be permitted.

H. The bottom slab shall be cast monolithically with the lower section and the longitudinal reinforcement extending into the slab.

I. No construction joints will be allowed below an elevation of four feet above mean sea level. Construction joints will be allowed above elevation+4.0, if adequate keyways and waterstops, approved by the Department, are provided. The Department may approve an alternate joint method in cases of excessively deeper and heavy structures.

J. Built-in ladders or climbing rungs will not be permitted in any sanitary sewer manhole and only in other structures where shown on the Plans and called for in the specifications.

K. Openings shall be sealed with "non-shrink" grout. No "expanding" grout shall be used.

L. Furnish manholes with accessories listed under "Manhole Accessories", below.

M. Lid and Frame: See Section 05550, "Castings".

2.02 CLAY BRICK UNITS

Clay brick shall be used in manhole construction. Clay brick shall conform to ASTM Standard C62-91b, "Building Brick (Solid Masonry Units Made from Clay or Shale)". Bricks shall have true edges and sharp corners and shall have been cured for at least 14 days before being placed in any wall.

2.03 MORTAR AND GROUT: As specified in Section 04060 and 03600, respectively.

2.04 REINFORCEMENT: As specified in Section 03300.

2.05 SUMP: Where required, formed integrally with the base slab.

2.06 COATING/LINING

A. Unless specified elsewhere, manhole interior coating shall be Carboline Bitumastic 300M or as approved by the Department.

B. All manholes receiving the discharge of a force main shall be lined on all interior concrete surfaces with T-Loc, by Ameron, AGRU "Suregrip" or approved equal (See Section 02615). Lining system shall fully protect openings, such as for pipes, to insure that corrosive attack cannot take place at these locations. Protective system design for these areas will be checked as shop drawings. Note that boot systems are not accepted by the Department.

C. All manhole exterior surfaces, from finished grade to base, shall be coated with Carboline Bitumastic 300M.

D. If Con^{MIC}Shield® anti-microbial agent is used, interior coating and liners can be eliminated.

2.07 MANHOLE ACCESSORIES:

All new sanitary sewer manholes shall be furnished with the following items. Where existing manholes will be modified or are scheduled to be refurbished, rehabilitation shall also include the following items unless otherwise approved by the Department.

A. Provide manhole frame system sealing system in accordance with Section 02620.

B. Provide protective liner system in accordance with subsection 2.06-B, above.

C. Provide high density polyethylene manhole infiltration inserts in accordance with Section 02625, unless the Department requires the installation of stainless steel insert.

D. Install a heat activated, high shrink membrane, on the manhole's exterior, at each section joint and from the cast iron frame to the corbel section. Membrane shall be Wrapid Seal, by Canusa Corrosion Protection and Sealing, or approved equal with the following properties:

PRODUCT COMPONENT	PROPERTY	TEST STANDARD	UNIT	RESULTS
ADHESIVE	Softening Point	ASTM E28	Deg. C (Deg. F)	100 (212)
	Lap Shear Strength	DIN 30 672	N/cm^2 (psi)	8 (12)
BACKING	Tensile Strength	ASTM D638	MPa (psi)	20 (2900)
	Elongation	ASTM D638	%	600
	Hardness	ASTM D2240	Shore D	46
	Abrasion Resistance	ASTM D1044	mg	45
SLEEVE	Peel Strength	ASTM D1000	N/cm^2 (psi)	15 (9)
	Water Absorption	ASTM D570	%	0.05
	Low Temp. Flexibility	ASTM D2671D	Deg. C (Deg. F)	-40 (-40)

PART 3 - EXECUTION

3.01 EXCAVATION:

A. Refer to Section 02314, "Excavation, Backfill and Fill for Structures" for specific procedures, requirements and testing methods appurtenant to the work under this Section.

B. Excavation shall extend to a level 12-inches below the level of the outside bottom of the base slab. If necessary, provide sheeting and shoring for the excavation.

C. Backfill resulting excavation with drainfield limerock or specified bedding material to a level to receive the structure at the proper elevation.

3.02 GENERAL INSTALLATION

A. The precast base shall be set level, with the walls plumb on the graded crushed rock bedding.

B. If any surfaces of structures are exposed to view and to a depth of 6 inches below grade, the Contractor shall fill all depressions and all air holes with mortar, dampen surfaces, and apply an approved bonding agent then spread slurry, consisting of one part cement and one and one-half parts sand, by damp loose volume, on the surface with clean burlap pads and sponge rubber floats. The Contractor shall remove any surplus by scraping and hen rubbing with clean burlap. Finish surface shall be suitable to receive paint.

3.03 INSTALLATION OF MANHOLES

A. Place base slab and manhole sections plumb and level.

B. During all backfilling operations, the backfill level shall be kept even on all sides of the structure. Exercise every precaution to prevent damage to, or unplanned loading of, the structures and its appurtenances.

C. Lay clay brick in running bond. A minimum of three and a maximum of five courses shall be constructed atop each manhole corbel. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work. Stucco inside and out with 3/4-inch of mortar.

D. Set cover frames and covers level without tipping, to correct elevations.

E. Exterior surfaces of all structures shall be painted prior to the installation as specified elsewhere herein.

F. Openings shall be sealed with non-shrink grout. No expanding grout shall be allowed.

G. After satisfactory installation and testing, all interior concrete surfaces of the new manhole shall be seal coated in accordance with Section 2.06-A.

H. The invert channels of the manhole shall be formed of brick or brick rubble thoroughly bedded and covered with sand-cement grout, accurately shaped to a semi-circular bottom conforming to the lower half of the connecting sewer pipe. Steep slopes outside the invert channels shall be avoided. Changes in size and grade shall be made gradually and evenly. Changes in the direction of the sewer or entering branch shall be a smooth curve with radius as long as practicable.

I. It shall be the Contractor's responsibility to assure that the frames and covers are set to match proposed finish paving grades at the manhole locations.

J. Gravity sewers shall connect to the manholes in accordance with Standard Details SS 7.0 and Section UC-250 "Gravity Sewer Systems".

3.04 ALTERNATE INSTALLATION

Installation methods given below in this Section shall only apply if permission if granted by the Engineer of Record to use the "Alternate Method of Construction" as specified elsewhere herein. All provisions of that Section shall be applied to the installation of the structures with the specific modifications as follows:

A. Excavation

Excavation shall be carried to a depth of two feet below the bottom of the base slab.

B. Special Bedding

1. Bedding shall be crushed stone or gravel meeting the requirements of ASTM Standard C33 "Concrete Aggregates", latest edition, gradation 67.
2. The bedding shall be placed in the excavation from cut bottom to the level of the bottom of the slab. Thereafter it shall be thoroughly rammed and tamped by use of a crane and weight or other means suitable to the Engineer of Record to provide a stable base for the structure. Tamping and, if necessary, additional filling shall be carried on until the Engineer of Record is satisfied that a suitably stable base has been created for the structure.

C. Backfill

1. After the structure is installed, special bedding material as specified immediately above shall be carefully hand or machine tamped around the structure up to a level of no more than eighteen inches above the water level. Thereafter the procedures and materials specified for backfill and compaction, shall be used to complete the installation.

2. During all backfilling operations the backfill level shall be kept even on all sides of the structure and the Contractor shall exercise every precaution to prevent damage to, or unplanned loading of, the structure or its appurtenances.

END OF SECTION